

Listing of Claims

1. (currently amended) An instrumented prosthetic knee trial comprising:

an articulating surface;

a polymer layer at the articulating surface;

a body having a curved contoured concave surface, the concave surface being curved in two intersecting planes; and

a sensor array between the polymer layer and the curved contoured surface of the body, the sensor array having a curved contour including a convex portion and a concave portion, the convex portion and the concave portion both being curved in two intersecting planes, the convex portion contacting and conforming to the shape of at least part of curved contoured concave surface of the body, the sensor array being capable of generating a signal in response to pressure;

the polymer layer having a curved contour including a convex surface and a concave surface, the convex surface contacting and conforming to the shape of at least part of the concave portion of the sensor array, the convex surface of the polymer layer overlying substantially all of the concave surface of the sensor array;

wherein the body, sensor array and polymer layer comprise discrete components, the sensor array being adhered to at least one of the convex surface of the polymer layer and the concave surface of the body.
2. (original) The instrumented prosthetic joint trial of claim 1 including a tibial tray trial, wherein the body comprises a tibial insert trial received in the tibial tray trial, said polymer layer and sensor array being carried on the tibial insert trial.

3. (original) The instrumented prosthetic joint trial of claim 1 wherein the polymer layer has a thickness of about 1/32 inch.
4. (original) The instrumented prosthetic joint trial of claim 1 wherein the polymer layer comprises polyethylene.
5. (previously presented) The instrumented prosthetic joint trial of claim 1 wherein the curved contoured surface of the body includes two concave portions, the curved contour of the sensor array includes two convex portions contacting the two concave portions of the body and two concave portions overlying the two convex portions, and the curved contour of the polymer layer includes two convex surfaces contacting the two concave portions of the sensor array and two concave surfaces overlying the two convex surfaces.
6. (original) The instrumented prosthetic joint trial of claim 1 further comprising electrical leads connected to the sensor array and extending beyond the polymer layer.
- 7 – 12 cancelled
13. (currently amended) A system for balancing soft tissue intraoperatively during knee joint arthroplasty comprising:
 - a first joint trial having a curved convex articulating surface;
 - a second joint trial having a curved concave articulating surface for receiving the convex articulating surface of the first joint trial, the curved concave articulating surface of the second joint trial being curved in two intersecting planes;

the second joint trial including:

a polymer layer at the articulating surface, the polymer layer having a curved concave top surface and an opposite curved convex surface, the curved concave top surface and the curved convex opposite surface being curved in two intersecting planes;

a sensor array below the polymer layer and a body below the sensor array, the body defining the curved concave surface of the second joint trial, the sensor array having a curved concave portion contacting and substantially conforming to the curved convex surface of the polymer layer and a curved convex portion contacting and substantially conforming to the curved concave surface of the articulating surface of the body, the sensor array being capable of generating a signal in response to pressure; a body below the sensor array, the body having a curved concave surface adjacent to the sensor array;

wherein the sensor array, the polymer layer and body comprise discrete components; and
wherein the sensor array is adhered to at least one of the curved convex surface of the polymer layer and the curved concave surface of the body.

14. (original) The system of claim 13 wherein the first joint trial comprises a femoral trial and the second joint trial comprises a tibial trial.

15. (original) The system of claim 13 wherein the polymer layer has a thickness of about 1/32 inch.

16. (original) The system of claim 13 wherein the polymer layer comprises polyethylene.

17. (original) The system of claim 13 further comprising electrical signal carrying lines leading from the sensor array, at least parts of said electrical signal carrying lines being spaced from the polymer layer.

18. (original) The system of claim 17 further comprising a computer connected to the electrical signal carrying lines.

19. (original) The system of claim 18 further comprising a camera operatively connected to the computer.

20-28 cancelled.

29. (currently amended) A method of balancing soft tissue during knee joint arthroplasty comprising:

providing a first joint trial having a curved convex articular surface;

providing a second joint trial having a curved concave articular surface for receiving the convex articular surface of the first joint trial, the curved concave articular surface being curved in two intersecting planes;

the second joint trial including:

a protective layer at the articulating surface, the protective layer have a concave surface and an opposite convex surface, both the concave surface and the convex surface being curved in two intersecting planes;

a sensor array below the protective layer, the sensor array having a curved contour substantially conforming to the curved contour of the articulating surface of the second

joint trial, the curved contour of the sensor array including a convex surface and an opposite concave surface, the concave surface of the sensor array being curved in two intersecting planes and contacting the convex surface of the protective layer, the convex surface of the protective layer substantially conforming to and substantially covering the concave surface of the sensor array, the sensor array being capable of generating a signal in response to pressure; and

a body below the sensor array, the body defining the curved concave surface of the second joint trial, the curved concave surface being curved in two intersecting planes, the convex surface of the sensor array contacting the curved concave surface of the body, the body and the protective layer comprising discrete components;

the sensor array being adhered to at least one of the curved convex surface of the protective layer and the curved concave surface of the body;

the method further comprising:

resecting adjacent portions of two bones;

placing the first joint trial on one of the resected bones and placing the second joint trial on the second resected bone;

flexing the bones about the first and second joint trials so that the curved convex articular surface of the first joint trial bears against the concave surface of the protective layer of the second joint trial.

30. (original) The method of claim 29 wherein the protective layer comprises polyethylene.

31. (original) The method of claim 29 wherein the protective layer has a thickness of about 1/32 inch.

32. (original) The method of claim 29 further comprising determining the contact area on one concave area of the articulating surface of the second joint trial at a plurality of relative positions of the first and second joint trials.

33. (original) The method of claim 29 further comprising determining the distribution of pressure on one concave area of the articulating surface of the second joint trial at a plurality of relative positions of the first and second joint trials.

34. (original) The method of claim 29 further comprising measuring forces at the articulation between the first and second trials.

35. (original) The method of claim 29 further comprising intraoperatively recording data selected from the group including at least one of the following: images of the surgical procedure; forces at the articulation between the first and second trials; and pressure distribution across at least a portion of the sensor array.

36. (original) The method of claim 29 further comprising releasing soft tissue around the joint.

37. (currently amended) A method of instructing surgeons in the art of knee joint arthroplasty comprising:

providing a first joint trial having a curved convex articular surface;

providing an instrumented second joint trial having a curved concave articulating surface for receiving the convex articulating surface of the first joint trial, the curved concave articulating surface being curved in two intersecting planes;

the second joint trial including:

a protective layer having a curved concave surface and an opposite convex surface, both the curved concave surface and the convex surface being curved in two intersecting planes;

a sensor array below the protective layer, the sensor array having a curved contour including a convex portion and an opposite concave portion, both the convex portion and the concave portion being curved in two intersecting planes, the sensor array being capable of generating a signal in response to pressure; and

a body below the sensor array, the body defining the curved concave surface receiving the convex portion of the sensor array, the curved concave surface of the body being curved in two intersecting planes, the body and the protective layer comprising discrete components;

wherein the sensor array is sandwiched between the body and the protective layer with the convex portion of the sensor array contacting and conforming to the concave surface of the body of the second joint trial and with the convex surface of the protector contacting, conforming to and substantially covering the concave portion of the sensor array; and

wherein the sensor array is adhered to at least one of the convex surface of the protective layer and the concave surface of the body;

the method further comprising:

resecting adjacent portions of two bones;

placing the first joint trial on one of the resected bones and placing the second joint trial on the second resected bone;

flexing the bones about the first and second joint trials so that portions of the first joint trial bear against contact portions of the protective layer.

38. (original) The method of claim 37 further comprising providing a computer to receive signals from the sensor array.

39. (original) The method of claim 38 further comprising providing an image recording device operatively connected to the computer.

40. (currently amended) A system for balancing soft tissue intraoperatively during knee joint arthroplasty comprising:

a body having a curved concave surface, the curved concave surface being curved in two intersecting planes;

a conformable sensor array; and

a preformed protective cover having a curved concave surface and an opposite curved convex surface, both the curved concave surface and the curved convex surface being curved in two intersecting planes, the convex surface of the preformed protective cover being sized and shaped to correspond to the shape of the curved concave surface of the body;

wherein the body, the sensor array and preformed protective cover comprise discrete components; and

wherein the sensor array is adhered to at least one of the body and the protective cover.

41. (original) The system of claim 40 wherein the preformed protective layer is locked to the joint trial and the conformable sensor array is positioned between the curved convex surface of the preformed protective cover and the curved concave surface of the body.

42. (original) The system of claim 41 wherein the protective layer is adhered to the sensor array and to the body.